APPENDIX A:

POTENTIAL HEALTH IMPACTS FROM EXPOSURE TO PM_{10}-BORNE PCBS FROM RECENT REMEDIATION ACTIONS

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POTENTIAL HEALTH IMPACTS FROM EXPOSURE TO PM_{10}-BORNE PCBs FROM RECENT REMEDIATION ACTIONS

Two recent remedial actions involving soil contaminated with polychlorinated biphenyls (PCBs) are addressed in this Supplemental Environmental Impact Statement. The first action involved the removal of buried capacitors and contaminated soil from an area within the National Ignition Facility (NIF) construction zone at Lawrence Livermore National Laboratory (LLNL) in September 1997. The second involved removal of residual PCB-contaminated soils from the East Traffic Circle (ETC) Area at LLNL discovered during excavation for drainage improvement in October 1998. Both actions involved the excavation and handling of PCB-contaminated soils (Table 3.1) that may have generated emissions of dust-borne PCBs. Because these two actions took place within the SEIS stipulated areas, the potential impacts of conducting the remedial actions were evaluated. The main impact of potential concern would be exposure of members of the public to dust-borne PCBs. In the following sections, such impacts are evaluated through a combined analysis of dust emission and dispersion modeling and PCB intake and toxicity analysis for hypothetical receptors at the site fence line.

A.1 ESTIMATES OF PM_{10} EMISSIONS AND DISPERSIONS FROM THE NIF CAPACITOR EXCAVATION

The evaluation of impacts from PCB-contaminated soils associated with the cleanup of buried capacitors that took place over a 10-day period in September 1997 at the NIF construction site involved the analysis of exposures to airborne contaminants generated during excavation and handling of the soils. The major concern is human health risk posed by exposure to PCB-contaminated dust. Accordingly, emissions of PM_{10}, the respirable fraction of dust, generated from the handling of the contaminated soils were examined.

To evaluate potential impacts, PM_{10} emissions from the action of heavy equipment were first estimated. Standard dust emission factors for generic excavation equipment and conservative meteorological conditions were assumed for these screening-level estimates. The estimated emissions were then used as input for air dispersion modeling to estimate 24-hour maximum concentrations at the closest site boundary. Other miscellaneous PM_{10} sources not directly related to contaminated soils were not considered. The estimated maximum PM_{10} concentration was then used to estimate human exposure and health impacts (Section A.3). The calculations were based on the conservative assumption that PCB concentrations were equal to the maximum value measured in soil samples from the excavation.

A.1.1 Description of Occurrence

During September 3-12, 1997 (5 actual working days), 112 capacitors containing PCBs were unearthed at the NIF construction site located in the northeastern quadrant of the LLNL Livermore Site. The 112 capacitors were removed from an excavated trench approximately 6 m (20 ft) wide, 21 m (70 ft) long, and 5.2 m (17 ft) deep. The capacitors and about 694 metric tons (766 short tons) of PCB-contaminated soil were removed in an emergency removal action executed by DOE/LLNL in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). This action was accomplished in full coordination with CERCLA Remedial Project Manager (RPMs), who represent the U.S. Environmental Protection Agency (EPA), the California Department of Toxic Substances Control, and the San Francisco Bay Regional Water Quality Board. The capacitors were placed in plastic-lined 55-gal drums and moved to the LLNL's Hazardous Waste Management TSCA storage facility (Bainer and Berg 1998). One excavator was operated full time; one tractor was used for leveling the area part time, and 36 truckloads of contaminated soil were shipped by Laidlaw Environmental Services off-site for incineration at the Laidlaw Environmental Services-Aptus incinerator in Clive, Utah.

A.1.2 Emission Estimations for PM_{10}

Actual cleanup activities are assumed to have taken place during daytime hours in a work area assumed to be 18 m (60 ft) by 34 m (110 ft), with a 6-m (20-ft) wide belt of land encircling the excavated trench. A bulldozer was conservatively assumed to represent an excavator because excavator emission factors are not available in reference sources. The PM_{10} emissions from an excavator (e.g., backhoe or front shovel) would be lower than those from a bulldozer, because an excavator stays at one location, excavates the soil, dumps it onto the receiving surface for some period of time, and then moves to the next location. A grader is assumed to represent the tractor with scoop that was used to level the general area and for minor cleanups during excavation. Use of a Ford 10/12 yd^3 dump truck, which could handle about 18 metric tons (20 short tons) of soil, is assumed. It was conservatively assumed that no dust control measures were applied and no precipitation fell during operations.

Emission factors used to develop the PM_{10} emission rates were estimated from a standard reference source (EPA 1995a, hereinafter referred to as AP-42). The emission factors estimated for the various activities are presented in Table A.1. The parameters used to estimate uncontrolled emission factors for specific activities are described below.

A.1.2.1 Excavating

A bulldozer was conservatively assumed to be used for excavation of the PCB-contaminated soils. The predictive equation for bulldozer operations is contained in Section 11.9

TABLE A.1 Estimated Total PM_{10} Emissions from PCB-Contaminated Soils Associated with Cleanup Activities at the NIF Site[a]

Activity	Equipment	Uncontrolled Emission Factor	Activity	Uncontrolled Emissions lb	Uncontrolled Emissions lb/d
Excavation	Excavator	2.41 lb/h	40 h	96.2	19.2
Grading	Tractor	1.54 lb/VMT[b]	8.3 mi	12.9	2.6
Unpaved road traffic	Truck	3.92 lb/VMT	1.5 mi	5.9	1.2
Dumping	-	0.00018 lb/ton	766 ton	1.0	0.2
Total				116	23.2

[a] Conversions:
To convert from pounds to kilograms, multiply by 0.45.
To convert from miles to kilometers, multiply by 1.61.
To convert from tons to kilograms, multiply by 907.18.

[b] VMT = vehicle miles traveled.

of AP-42 and depends on the silt and moisture content of materials being handled. The average values for overburden silt and moisture content given in Section 11.9 of AP-42 are 6.9% and 7.9%, respectively. For exposed topsoil, the average values for silt and moisture content are given as 15% and 3.4%, respectively, in Section 13.2.4 of AP-42. Because excavation includes both topsoil and subsurface material, the overall average of 11% and 5.7% for silt and moisture contents were used for these calculations.

A.1.2.2 Grading

Periodic grading was conducted to level the general area during excavations. The predictive emission factor for grading was taken from Section 11.9 of AP-42. The only variable for this factor is the mean grader speed, for which a value of 11.4 km/h (7.1 mph) was assumed for this analysis.

A.1.2.3 Unpaved Road Traffic

It was assumed that the vehicle used to transport the contaminated soil from the site would travel over an unpaved area at the NIF Construction Area. The predictive equation for travel on an unpaved work area was taken from Section 13.2.2 of AP-42. The emissions from this activity are affected by silt content of road aggregate, the characteristics of the vehicle (such as speed, weight, number of wheels), and the number of dry days per year. For this analysis, a silt content of 11% as determined above was used. Equipment specifications for a

Ford 10/12 yd^3 dump truck were used (Nowinski 1993). A 10-wheel truck with an average weight of 18 metric tons (20 short tons) was assumed to be operated at a speed of 16 km/h (10 mph). The number of days with at least 0.25 mm (0.01 in.) of precipitation was conservatively assumed to be 0.

A.1.2.4 Dumping

Dumping activities during cleanup activities included loading contaminated soils onto a truckbed for transport. The predictive factor used for aggregate handling and storage piles was taken from Section 11.2.4 of AP-42. The moisture content of the material transferred and the average wind speed would affect these emissions. Assumptions made for the analysis included a silt content of 11% as determined above and a wind speed of 7.9 m/s (17.7 mph), which was the highest wind speed recorded at LLNL in September 1994 (LLNL 1995).

Emissions from an uncovered truckbed while the truck was being operated were not considered because the truck would be operating at a low speed. Wind erosion from the exposed work area was not considered, under the assumption that contaminated soils being excavated would be shipped off-site as they were excavated, i.e., no stockpiles were maintained.

To estimate total PM_{10} emissions, the emission factors derived above were multiplied by the activity rates. For excavation, an excavator was operated full time, so the total time of operation was 40 hours over 5 actual working days. For leveling operations during cleanup operations, a tractor was operated part-time, so the total time of operation was assumed to be 20 hours over 5 actual working days. It was conservatively assumed that each hour the tractor made 10 round-trips of a distance equivalent to the longer side of the work area. The truck was assumed to travel into (for loading) and out of (for transporting) the work area. Similarly, the truck was assumed to travel one round-trip of the longer side of the work area per truckload. For dumping, 694 metric tons (766 short tons) of the PCB-contaminated soils were handled. Estimated uncontrolled PM_{10} emissions resulting from the handling of PCB-contaminated soils under these conditions are summarized in Table A.1.

A.1.3 Air Dispersion Modeling Results

To assess potential impacts from cleanup activities at the NIF site, the PCB-contaminated PM_{10} emission estimates were used in air dispersion modeling to determine the PM_{10} concentration in air at the nearest site boundary and the potential health-related impacts of those emissions. Screening-level air dispersion modeling was first used. This modeling involved simplified calculations incorporating sufficient conservatism to determine if a source of pollutants posed a potential health threat. If the screening-level modeling were to indicate a possible health threat, then more refined modeling would be warranted.

The SCREEN3 model was used to conduct the conservative screening analysis consistent with EPA's guideline on air quality models (EPA 1995b-c). The "rural" dispersion option was selected, and source and receptor heights were assumed to be at ground level. The receptor location was placed at the closest site boundary (about 400 m [1,300 ft] east of the NIF construction site) that might be accessible to the public. The maximum 1-hour PM_{10} concentration level was predicted by modeling to be 255 µg/m^3 under neutral atmospheric stability conditions (class D), a wind speed of 1 m/s (2.2 mph) (likely to be the worst meteorological conditions during daytime working hours) and steady wind direction. Conservatively assuming PM_{10} emissions from the cleanup activities were sustained at maximum computed values for an 8-hour work period with the specified meteorological conditions (class D and unvarying winds at 1 m/s) maintained during this period, then the maximum 24-hour PM_{10} concentration would be 85 µg/m^3 ([8 × 255]/24). However, actual expected PM_{10} concentrations at the closest site boundary would be much lower because meteorological conditions, such as wind direction and speed and atmospheric stability, would only favor maximum exposures there a fraction of the time.

A.2 ESTIMATES OF PM_{10} EMISSIONS AND DISPERSION FROM THE EAST TRAFFIC CIRCLE AREA EXCAVATION

Discovery and cleanup activities for PCB-contaminated soils discovered at the ETC Area took place from October 1998 through July 1999. The evaluation of air quality impacts associated with those cleanup activities involved primarily analysis of exposures to airborne contaminants generated during excavation and handling of such wastes. The major concern is human health risk posed by PCB-contaminated soils, and, accordingly, PM_{10} emissions from contaminated soil handling activities were evaluated. PM_{10} emissions were estimated and then air dispersion modeling was performed to estimate 24-hour maximum concentrations at the closest site boundary. Other miscellaneous PM_{10} sources not directly related to contaminated soils were not considered. Descriptions of cleanup activities and meteorological conditions were not provided in detail, so conservative assumptions were made wherever possible. The cleanup activities of PCB-contaminated soil are briefly described as follows:

- In October 1998, excavated PCB-contaminated soil was removed from the ETC Area and transported to the M&O staging area next to Building B639. This soil was staged in the two southernmost soil storage bins on the western side of the M&O soil storage area. The soil was placed on and covered with plastic. However, detailed information for these activities is not available, so it is assumed that the same levels of activities that occurred in January 1999 would take place.

- About 230 m^3 (300 yd^3) of stockpiled soil was removed from the M&O staging area and transported to an off-site hazardous waste disposal facility, Envirosafe, Inc., at Grandview, Idaho, over the period of January 6-8, 1999. For this activity, heavy equipment with front-end loader and backhoe was used to load the soil on trucks. A total of 15 truckloads of soil were shipped off-site, and cleanup activities were conducted in the morning hours. On January 20, 1999, on the basis of the results of soil sampling analysis, about 7.7 m^3 (10 yd^3) more of surface soil was removed and placed in a 14-m^3 (20-yd^3) roll-off bin, which was subsequently transported to the same off-site facility.

- On May 5, 1999, the area at the ETC Area was scraped, and about 27 m^3 (35 yd^3) more soil was collected for off-site disposal at the same Idaho facility. A small front-end loader and scraper with a backhoe attachment was used for this activity. Results of subsequent sampling indicated that a smaller area defined by three sampling locations remained where additional soil had to be removed to achieve the CERCLA RPMs’ agreed upon action level of 18 ppm. On June 7, 1999, an additional 46 m^3 (60 yd^3) of soil was scraped from the affected area, and the exposed surface was resampled for PCBs. One location remained above the action level. On July 8, 1999, an additional 12 m^3 (15 yd^3) of soil was removed from the final location and resampled for PCBs. Analytical results indicated that the PCB concentration at the remaining location was below the action level of 18 ppm (Joma 2000).

The air quality analysis described here is based on reports of these activities through July 1999.

A.2.1 Assumptions

For modeling purposes, the work area where cleanup activities took place was assumed to be a square area of 30 m by 30 m (100 ft by 100 ft) around the contaminated area or stockpiled area. Cleanup activities are assumed to take place during the daytime hours only (e.g., 8:30 a.m.-12:30 p.m.). A bulldozer was conservatively assumed to represent an excavator (e.g., backhoe) and a scraper. In fact, PM_{10} emissions from an excavator (e.g., backhoe) are lower than those from a bulldozer, because an excavator stays at one location, excavates the soil and dumps it onto the receiving surface over some period of time, and then moves to the next location. Scraping using a front-end loader/scraper at the ETC Area was assumed to be represented by bulldozing because this activity is different from tractor-scraper activity.

A.2.2 PM_{10} Emission Estimates

Emission factors used to develop the PM_{10} emission rates were estimated from a standard reference source (EPA 1995a, hereinafter referred to as AP-42). The emission factors estimated for the various activities are the same as those presented in Table A.1. The parameters used to estimate uncontrolled emission factors for specific activities are described below.

A.2.2.1 Bulldozing

The calculations for backhoe and surface scraping operations used the predictive equation for bulldozing operation contained in Section 11.9 of AP-42; that equation is dependent on the silt and moisture content of materials being handled. The average values for overburden silt and moisture content given in Section 11.9 of AP-42 are 6.9% and 7.9%, respectively. For exposed topsoil, the average values for silt and moisture content are given in Section 13.2.4 of AP-42 as 15% and 3.4%, respectively. Because excavation includes both topsoil and subsurface material, the overall average of 11% and 5.7% for silt and moisture contents were used for these calculations.

A.2.2.2 Unpaved Road Traffic

The predictive equation for vehicular traffic (haul trucks and front-end loader) on the contaminated work area was taken from Section 13.2.2 of AP-42. This factor is affected by silt content of road aggregate, the characteristics of the vehicle (speed, weight, number of wheels), and the number of dry days per year. For the analysis, a silt content of 11% as determined above was used. For haul trucks, equipment specification data for the Mack MR600S dump truck were used. A 10-wheel truck with an average weight of 20.3 tons is assumed to be operated at a speed of 10 mph (16 km/h). A 4-wheel front-end loader weighing 6.9 tons is assumed to be operated at a speed of 5 mph (8 km/h). The number of days with at least 0.25 mm (0.01 in.) of precipitation per year was conservatively assumed to be 0.

A.2.2.3 Dumping

Dumping includes loading contaminated soils onto a truckbed for transport or into storage bins. The predictive factor used for aggregate handling and storage piles was taken from Section 11.2.4 of AP-42. The moisture content of the material being transferred and the average wind speed affects these emissions. For the analysis, a silt content of 11% as determined above was assumed, and the highest wind speed of 9.4 m/s (21 mph) recorded at LLNL in 1994 (Govenia 1995) was used.

Emissions of dust from a truckbed while the truck is in operation were not considered because the truck would be traveling at a low speed for on-site transport, and the load would be covered with a tarp for off-site shipping. Wind erosion from the exposed work area was assumed to be negligible because the pile of waste was covered with plastic each evening.

To estimate total PM_{10} emissions, the emission factors derived above were multiplied by the activity rates. A front-end loader and backhoe was assumed to operate 2 hours/day for the period January 6-8, 1999 (a total of 12 hours), and 1 hour on January 22, 1999. The same levels of activities as those on January 6-8, 1999, were assumed for work in October 1998. On May 5, 1999, a small front-end loader and scraper were used for 2 hours each (a total of 4 hours) to remove soils. Conservatively, the truck was assumed to come into (for loading) and out of (for transporting) the contaminated work area and move around the work area for the best location. It was conservatively assumed that the truck traveled one round-trip of the side of the work area per truckload of soil. For dumping, a maximum of about 237 m^3 (310 yd^3) of the PCB-contaminated soils at the M&O staging area was handled. Although water was sprayed to keep the dust to the minimum at the work area, for these calculations it was conservatively assumed that no dust control measures were used. Estimated uncontrolled PM_{10} emissions resulting from the handling of PCB-contaminated soils associated with the ETC operations are summarized in Table A.2.

A.2.3 Air Dispersion Modeling Results

To assess potential impacts from cleanup activities of PCB-contaminated soils originating from the ETC Area, air dispersion modeling was performed using the PM_{10} emissions values estimated above. First, screening-level air dispersion modeling was used, which involves simplified calculations designed with sufficient conservatism to determine if a source of pollutants poses a potential health threat. If the screening-level modeling had indicated that the emissions posed any health threat, then a refined modeling would have been warranted.

The SCREEN3 model recommended by EPA (EPA 1995b) was used for screening purposes. The “rural” dispersion option was conservatively selected, and source and receptor heights were assumed to be at ground level. The receptor location was placed at the closest site boundary (about 100 m [330 ft] and 400 m [1,300 ft] due east of the M&O staging area and the ETC, respectively) that might be accessible to the general public. For activities at the M&O staging area, the maximum 1-hour PM_{10} concentration level was predicted to be 1,990 $\mu g/m^3$ for neutral atmospheric stability (Class D) and a wind speed of 1 m/s, which are likely to be the worst meteorological conditions during daytime working hours. If this level of PM_{10} concentration was assumed to be maintained for 4 working hours, then the maximum 24-hour PM_{10} concentration would be 332 $\mu g/m^3$. However, actual PM_{10} concentrations at the closest site boundary would be much lower because meteorological conditions, such as wind direction and speed and atmospheric stability, are continuously changing. On the other hand, concentration levels from activities at the ETC — predicted at a 1-hour average of 243 $\mu g/m^3$ and 24-average of 40 $\mu g/m^3$ — are an order of magnitude lower than those at the M&O staging area. Therefore, estimated impacts from activities in the M&O area alone would sufficiently represent the entire action in this screening level analysis.

A.3 HEALTH RISK ESTIMATES

Cancer and noncancer risk estimates were determined for both actions by using conventional calculation practice as recommended by the EPA (1989). Only a single

TABLE A.2 Estimated Total PM_{10} Emissions from PCB-Contaminated Soils Associated with Cleanup Activities at the East Traffic Circle Area[a]

Activity	Uncontrolled Emission Factor	Activity	Uncontrolled Emissions (lb)	Uncontrolled Emissions (lb/h)
From ETC Area to M&O Staging Area				
Backhoe	2.41 lb/h	6 h	14.4	1.2
Front-end loader	0.58 lb/VMT[b]	30 mi	17.4	1.5
Truck traffic	3.92 lb/VMT	0.6 mi	2.2	0.19
Dumping	0.0017 lb/ton	642 tons	1.1	0.09
Total			35.1	2.9
From M&O Staging Area to Off-Site Facility				
Backhoe	2.41 lb/h	7 h	16.8	1.2
Front-end loader	0.58 lb/VMT[b]	35 mi	20.2	1.4
Truck traffic	3.92 lb/VMT	0.6 mi	2.4	0.2
Dumping	0.0017 lb/ton	332 tons	0.6	0.05
Total			40.0	2.9
From ETC Area to Off-Site Facility				
Scraper	2.41 lb/h	2 h	4.8	1.2
Front-end loader	0.58 lb/VMT[b]	10 mi	5.8	1.4
Truck traffic	3.92 lb/VMT	0.1 mi	0.3	0.1
Dumping	0.0017 lb/ton	37 tons	0.1	0.01
Total			11.0	2.7

[a] Conversions:
To convert from pounds to kilograms, multiply by 0.45.
To convert from miles to kilometers, multiply by 1.61.
To convert from tons to kilograms, multiply by 907.18.

[b] VMT = vehicle miles traveled.

contaminant of concern — PCBs — is identified for the analyses. Similarly, only a single exposure pathway is relevant — inhalation of contaminated dusts (PM_{10}). The exposure scenarios assumed that an adult member of the public was standing at the nearest point of public access to the excavation, the fence line due east. The LLNL is an industrial site, and visits of children to the vicinity of the Stipulated Areas would be few and of short duration. Areas outside the fenceline to the east are open fields; any children entering them or riding bikes along the roadway would do so only for brief periods of time. No schools or other institutions are located near the fenceline where children stay or homes where children live. This hypothetical receptor was assumed to stand outdoors at this location for the entire duration of the action and inhale the 1-hour maximum PM_{10} concentration. The concentration of PCBs on the PM_{10} was assumed to be the maximum detected in soil samples. This value was converted to a PCB concentration in air via the PM_{10} concentration. The intake of contaminant *i* by the receptor, I_i, was then computed using the following equation:

$$I_i = \frac{C_i \times IR \times ET \times EF \times ED}{BW \times AT} \ , \tag{A.1}$$

where

C_i = air concentration of contaminant *i* (mg/m^3);

IR = inhalation rate (m^3/h);

ET = exposure time (h/d);

EF = exposure frequency (d/yr);

ED = exposure duration (yr);

BW = body weight (kg); and

AT = averaging time (d).

Table A.3 presents the values used in this equation, computed intakes, and computed cancer risks and noncancer impacts for the two actions evaluated. To calculate excess cancer risk, the computed intake is multiplied by the cancer toxicity value (slope factor) for PCBs (2.0 kg-day/mg, EPA IRIS, June 1, 1997). The slope factor used represents an upper bound value and applies to environmental exposures, including those from inhalation of dusts. A standard 70-year exposure averaging time was used to put the cancer risk estimate on the same exposure time basis as the slope factor. Cancer risks estimates for shorter exposures are proportionately smaller.

TABLE A.3 Intake Parameters, Computed Intakes, and Computed Excess Cancer Risks and Noncancer Impacts for Hypothetical Exposures to Airborne PCBs from Recent Remedial Actions at the NIF Construction Area and East Traffic Circle Area

Input/Result	NIF Capacitor Excavation	ETC PCB Soil Excavation
Distance to fence line	400 m	100 m
PM_{10} 1-h max.	255 μg/m^3	1,990 μg/m^3
PCB conc. on dust	66 μg/g	133 μg/g
PCB conc. in air, 1-h max (C_i)	0.017 μg/m^3	0.26 μg/m^3
Inhalation rate (IR)	0.83 m^3/h	0.83 m^3/h
Exposure time (ET)	8 h/day	4 h/day
Exposure frequency (EF)	10 day/yr	4 day/yr
Exposure duration (ED)	1 yr	1 yr
Body weight (BW)	70 kg	70 kg
Averaging time (AT), cancer	25,550 days (70 yr)	25,550 days (70 yr)
Averaging time, non-cancer	10 days	4 days
Intake, cancer (I_c)	6.2×10^{-10} mg/kg-day	2.0×10^{-9} mg/kg-day
Slope factor (SF)	2 kg-day/mg	2 kg-day/mg
Excess cancer risk (SF x I_c)	1×10^{-9}	4×10^{-9}
Intake, non-cancer (I_{nc})	1.6×10^{-6} mg/kg-day	1.25×10^{-5} mg/kg-day
Reference dose (RfD)	2×10^{-5} mg/kg-day	2×10^{-5} mg/kg-day
Hazard quotient (I_{nc} ÷RfD)	0.08	0.6

Estimated excess cancer risks to a hypothetical receptor were 1×10^{-9} and 4×10^{-9} for the NIF and ETC area excavations, respectively. These values are well below the point of departure for determining remediation goals of 1×10^{-6} (40 CFR 300, National Oil and Hazardous Substances Pollution Contingency Plan, Final Rule, March 8, 1990).

Computation of intakes for noncancer risks also used Equation A.1, except an averaging time equal to the exposure period (10 or 4 days) was used. Such an exposure period is consistent with acute exposures, but in this analysis the more sensitive toxicity value for chronic exposure was used. The conservatively computed intake was then compared to a reference dose that represents a safe level for chronic exposure (2.0×10^{-5} mg/kg-day [AR1254, EPA IRIS, March 1, 1997]). This reference dose was developed by using oral exposures. No inhalation reference dose value was available in IRIS. However, except for a number of metals and certain other contaminants, it is generally acceptable to extrapolate an oral toxicity value to inhalation exposures, particularly for screening purposes.

The computed hazard quotients of 0.08 for the NIF capacitor excavation and 0.6 for the ETC excavation in this case indicates exposures that are below the threshold level of 1.0

considered safe for even chronic exposures (EPA [1997] IRIS). As with cancer risks, then, noncancer risks can be considered below levels of concern. The results for these conservative screening-level analyses eliminate the need for more detailed analysis of health risks.

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